IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Original) A processing system for treating a substrate comprising:

a chemical treatment system for chemically altering exposed surface layers on said substrate comprising a temperature controlled chemical treatment chamber, a temperature controlled substrate holder mounted within said chemical treatment chamber and configured to be substantially thermally insulated from said chemical treatment chamber, a vacuum pumping system coupled to said chemical treatment chamber, and a gas distribution system configured to introduce one or more process gases into said chemical treatment chamber and having a temperature controlled portion exposed to said one or more process gases in said chemical treatment chamber;

a thermal treatment system for thermally treating said chemically altered surface layers on said substrate, said thermal treatment system comprising a temperature controlled thermal treatment chamber, a temperature controlled substrate holder mounted within said thermal treatment chamber and configured to be substantially thermally insulated from said thermal treatment chamber, and a vacuum pumping system coupled to said thermal treatment chamber; and

an isolation assembly disposed between said thermal treatment system and said chemical treatment system.

2. (Original) The processing system as recited in claim 1 further comprising a controller coupled to at least one of said chemical treatment system and said thermal treatment system, and configured to perform at least one of setting, monitoring, and adjusting

at least one of a chemical treatment chamber temperature, a chemical treatment gas distribution system temperature, a chemical treatment substrate holder temperature, a chemical treatment substrate temperature, a chemical treatment processing pressure, a chemical treatment gas flow rate, a thermal treatment chamber temperature, a thermal treatment substrate holder temperature, a thermal treatment substrate temperature, a thermal treatment processing pressure, and a thermal treatment gas flow rate.

3. (Original) The processing system as recited in claim 1, wherein said isolation assembly provides at least one of thermal isolation, and vacuum isolation.

4. (Original) The processing system as recited in claim 1, wherein said isolation assembly comprises at least one of a thermal insulation assembly, a gate valve assembly, and a transfer system.

5. (Original) The processing system as recited in claim 4, wherein said isolation assembly comprises said thermal insulation assembly and said thermal insulation assembly is coupled to said chemical treatment chamber and said thermal treatment chamber, configured to substantially thermally insulate said chemical treatment chamber from said thermal treatment chamber, and configured to permit the passage of said substrate therethrough.

6. (Original) The processing system as recited in claim 5, wherein said thermal insulation assembly comprises a thermal insulation plate and an interface plate.

7. (Original) The processing system as recited in claim 6, wherein said thermal insulation plate provides a thermal barrier between said chemical treatment chamber and said thermal treatment chamber.

8. (Original) The processing system as recited in claim 6, wherein said thermal insulation plate comprises at least one of Teflon, alumina, sapphire, and quartz.

9. (Original) The processing system as recited in claim 6, wherein said interface plate comprises at least one structural contact member, said structural contact member provides a structural coupling between said chemical treatment chamber and said thermal treatment chamber.

10. (Original) The processing system as recited in claim 6, wherein said interface plate comprises at least one of aluminum, coated aluminum, stainless steel, bronze, and nickel.

11. (Original) The processing system as recited in claim 1, wherein said one or more process gases comprise at least one of HF and $NH_3$.

12. (Original) The processing system as recited in claim 1, wherein said temperature controlled substrate holder in said chemical treatment chamber comprises at least one of an electrostatic clamping system, a back-side gas supply system, and one or more temperature control elements.

13. (Original) The processing system as recited in claim 12, wherein said temperature controlled substrate holder in said chemical treatment chamber includes one or more temperature control elements and said one or more temperature control elements comprise at least one of a cooling channel, a heating channel, a resistive heating element, a radiant lamp, and a thermo-electric device.

14. (Original) The processing system as recited in claim 1, wherein said temperature controlled chemical treatment chamber comprises at least one of a cooling channel, a heating channel, a resistive heating element, a radiant lamp, and a thermo-electric device.

15. (Original) The processing system as recited in claim 1, wherein said gas distribution system comprises at least one gas distribution plenum.

16. (Original) The processing system as recited in claim 1, wherein said gas distribution system comprises at least one gas distribution plate, said gas distribution plate comprises one or more gas injection orifices.

17. (Original) The processing system as recited in claim 1, wherein said one or more process gases comprises a first gas and a second gas different from said first gas.

18. (Original) The processing system as recited in claim 17, wherein said gas distribution system comprises a first gas distribution plenum and a first gas distribution plate having a first array of one or more orifices and a second array of one or more orifices for coupling said first gas to said process space through said first array of one or more orifices in said first gas distribution plate, and a second gas distribution plenum and a second gas

distribution plate having passages therein for coupling said second gas to said process space through said passages in said second gas distribution plate and said second array of one or more orifices in said first gas distribution plate.

19. (Original) The processing system as recited in claim 17, wherein said first gas and said second gas are independently introduced to said process space without any interaction except in said process space.

20. (Original) The processing system as recited in claim 1, wherein said thermal treatment system further comprises a substrate lifter assembly coupled to said thermal treatment chamber for vertically translating said substrate between a transfer plane and said substrate holder.

21. (Original) The processing system as recited in claim 20, wherein said substrate lifter assembly comprises a blade having three or more tabs for receiving said substrate, and a drive system for vertically translating said substrate between said substrate holder and a transfer plane.

22. (Original) The processing system as recited in claim 1, wherein said chemical treatment system and said thermal treatment system are coupled to a manufacturing system.

23. (Original) The processing system as recited in claim 1, wherein said thermal treatment system further comprises a gas injection system coupled to said thermal treatment chamber and configured to introduce a gas to said thermal treatment chamber.

24. (Original) A method of operating a processing system to treat a substrate comprising:

transferring said substrate into a chemical treatment system comprising a temperature controlled chemical treatment chamber, a temperature controlled substrate holder mounted within said chemical treatment chamber, a vacuum pumping system coupled to said chemical treatment chamber, a gas distribution system configured to introduce one or more process gases into said chemical treatment chamber and having a temperature controlled portion exposed to said one or more process gases in said chemical treatment chamber, and a controller coupled to said chemical treatment system;

setting chemical processing parameters for said chemical treatment system using said controller, wherein said chemical processing parameters comprise a chemical treatment processing pressure, a chemical treatment chamber temperature, a chemical treatment gas distribution system temperature, a chemical treatment substrate temperature, a chemical treatment substrate holder temperature, and a chemical treatment gas flow rate;

processing said substrate in said chemical treatment system using said chemical processing parameters;

transferring said substrate into a thermal treatment system comprising a thermal treatment chamber, a temperature controlled substrate holder mounted within said thermal treatment chamber, and a vacuum pumping system coupled to said thermal treatment chamber, and said controller coupled to said thermal treatment chamber, wherein said thermal treatment system is coupled to said chemical treatment system via an isolation assembly;

setting thermal processing parameters for said thermal treatment system using said controller, wherein said thermal processing parameters comprise a thermal treatment processing pressure, a thermal treatment chamber temperature, a thermal treatment substrate temperature, and a thermal treatment substrate holder temperature; and

processing said substrate in said thermal treatment system using said thermal processing parameters.

25. (Original) The method as recited in claim 24, wherein said isolation assembly provides at least one of thermal isolation, and vacuum isolation.

26. (Original) The method as recited in claim 24, wherein said isolation assembly comprises at least one of a thermal insulation assembly, a gate valve assembly, and a transfer system.

27. (Original) The processing system as recited in claim 26, wherein said isolation assembly includes said thermal insulation assembly and said thermal insulation assembly is coupled to said chemical treatment chamber and said thermal treatment chamber, configured to substantially thermally insulate said chemical treatment chamber from said thermal treatment chamber, and configured to permit the passage of said substrate therethrough.

28. (Original) The processing system as recited in claim 27, wherein said thermal insulation assembly comprises a thermal insulation plate and an interface plate.

29. (Original) The method as recited in claim 28, wherein said thermal insulation plate provides a thermal barrier between said chemical treatment chamber and said thermal treatment chamber.

30. (Original) The method as recited in claim 29, wherein said thermal insulation plate comprises at least one of Teflon, alumina, sapphire, and quartz.

31. (Original) The method as recited in claim 28, wherein said interface plate comprises at least one structural contact member, said structural member provides a structural coupling between said chemical treatment chamber and said thermal treatment chamber.

32. (Original) The method as recited in claim 28, wherein said interface plate comprises at least one of aluminum, coated aluminum, stainless steel, bronze, and nickel.

33. (Original) The method as recited in claim 24, wherein said process gas comprises at least one of HF and $NH_3$.

34. (Original) The method as recited in claim 24, wherein said temperature controlled substrate holder of said chemical treatment system comprises at least one of an electrostatic clamping system, a back-side gas supply system, and one or more temperature control elements.

35. (Original) The method as recited in claim 34, wherein said temperature controlled substrate holder comprises said one or more temperature control elements and said one or more temperature control elements comprise at least one of a cooling channel, a heating
channel, a resistive heating element, a radiant lamp, and a thermo-electric device.

36. (Original) The method as recited in claim 24, wherein said temperature controlled chemical treatment chamber comprises at least one of a cooling channel, a heating channel, a resistive heating element, a radiant lamp, and a thermo-electric device.

37. (Original) The method as recited in claim 24, wherein said gas distribution system comprises at least one gas distribution plenum.

38. (Original) The method as recited in claim 24, wherein said gas distribution system comprises at least one gas distribution plate, said gas distribution plate comprises one or more gas injection orifices.

39. (Original) The method as recited in claim 24, wherein said one or more process gases comprises a first gas and a second gas different from said first gas.

40. (Original) The method as recited in claim 39, wherein said gas distribution system comprises a first gas distribution plenum and a first gas distribution plate having a first array of one or more orifices and a second array of one or more orifices for coupling said first gas to said process space through said first array of one or more orifices in said first gas distribution plate, and a second gas distribution plenum and a second gas distribution plate having passages therein for coupling said second gas to said process space through said passages in said second gas distribution plate and said second array of one or more orifices in said first gas distribution plate.

41. (Original) The method as recited in claim 39, wherein said first gas and said second gas are independently introduced to said process space without any interaction except in said process space.

42. (Original) The method as recited in claim 24, wherein said thermal treatment system further comprises a substrate lifter assembly coupled to said thermal treatment chamber for vertically translating said substrate between a transfer plane and said substrate holder.

43. (Original) The method as recited in claim 42, wherein said substrate lifter assembly comprises a blade having three or more tabs for receiving said substrate, and a drive system for vertically translating said substrate between said substrate holder and a transfer plane.

44. (Original) The method as recited in claim 24, wherein said setting a chemical treatment chamber temperature comprises heating said chemical treatment chamber using a wall temperature control unit and monitoring said chemical treatment chamber temperature.

45. (Original) The method as recited in claim 44, wherein said chemical treatment chamber temperature ranges from about 10° to about 200° C.

46. (Original) The method as recited in claim 34, wherein said setting a chemical treatment substrate holder temperature comprises adjusting at least one of said one or more temperature control elements and monitoring said chemical treatment substrate holder temperature.

47. (Original) The method as recited in claim 46, wherein said chemical treatment substrate holder temperature ranges from about 10° C to about 50° C.

48. (Original) The method as recited in claim 34, wherein said setting a chemical treatment substrate temperature comprises adjusting at least one of said one or more temperature control elements, said backside gas supply system, and said clamping system, and monitoring said chemical treatment substrate temperature.

49. (Original) The method as recited in claim 48, wherein said chemical treatment substrate temperature ranges from about 10° C to about 50° C.

50. (Original) The method as recited in claim 24, wherein said setting said chemical treatment processing pressure comprises adjusting at least one of said vacuum processing system and said gas distribution system, and monitoring said chemical treatment processing pressure.

51. (Original) The method as recited in claim 50, wherein said chemical treatment processing pressure ranges from about 1 to about 100 mTorr.

52. (Original) The method as recited in claim 24, wherein said setting of said chemical treatment gas distribution system temperature comprises heating said gas distribution system using a gas distribution system temperature control unit and monitoring said chemical treatment gas distribution system temperature.

53. (Original) The method as recited in claim 50, wherein said chemical treatment gas distribution system temperature ranges from about 10° to about 200° C.

54. (Original) The method as recited in claim 24, wherein said setting of said thermal treatment chamber temperature comprises heating said thermal treatment chamber using a thermal wall temperature control unit coupled to said thermal treatment chamber and monitoring said thermal treatment chamber temperature.

55. (Original) The method as recited in claim 54, wherein said thermal treatment wall temperature ranges from about 20° to about 200° C.

56. (Original) The method as recited in claim 24, wherein said setting of said thermal treatment substrate holder temperature comprises adjusting a substrate heating assembly coupled to said heated substrate holder and monitoring said thermal treatment substrate holder temperature.

57. (Original) The method as recited in claim 56, wherein said thermal treatment substrate holder temperature exceeds about 100° C.

58. (Original) The method as recited in claim 24, wherein said setting of said thermal treatment substrate temperature comprises adjusting a substrate heating assembly coupled to said heated substrate holder and monitoring said thermal treatment substrate temperature.

59. (Original) The method as recited in claim 58, wherein said thermal treatment substrate temperature ranges from about 100° C to about 200° C.

60. (Original) The method as recited in claim 24, wherein said thermal treatment system further comprises an upper assembly coupled to said thermal treatment chamber, said

upper assembly comprises at least one of a gas distribution system, a cover, and a radiant heater assembly and said setting of said thermal processing parameters includes setting a temperature of said upper assembly.

61. (Original) The method as recited in claim 60, wherein said setting of said upper assembly temperature comprises heating said upper assembly using an upper assembly temperature control unit coupled to said upper assembly and monitoring said thermal treatment upper assembly temperature.

62. (Original) The method as recited in claim 60, wherein said thermal treatment upper assembly temperature ranges from about 20° to about 200° C.

63. (Original) The method as recited in claim 24, further comprising coupling said chemical treatment system and said thermal treatment system to a manufacturing system.

64. (Original) The method as recited in claim 24, wherein said thermal treatment system further comprise means for introducing a gas to said thermal treatment system, said means for introducing a gas can set a thermal treatment gas flow rate.

65. (Original) A processing system for treating a substrate comprising:

a chemical treatment system for chemically treating said substrate by altering at least one exposed oxide surface layer on said substrate comprising a chemical treatment chamber, a substrate holder mounted within said chemical treatment chamber, a vacuum pumping system coupled to said chemical treatment chamber, and a gas distribution system for introducing one or more process gases into said chemical treatment chamber;

a thermal treatment system for thermally treating said at least one chemically altered oxide surface layer on said substrate, said thermal treatment system comprising a thermal treatment chamber, a temperature controlled substrate holder mounted within said thermal treatment chamber, and a vacuum pumping system coupled to said thermal treatment chamber; and

an isolation assembly disposed between said thermal treatment system and said chemical treatment system,

wherein said chemical treatment and said thermal treatment produces an etch amount of said exposed oxide surface layer in excess of about 10 nm per 60 seconds of chemical treatment for thermal oxide, an etch amount of said exposed oxide surface layer in excess of about 25 nm per 180 seconds of chemical treatment for thermal oxide, and an etch amount of said exposed oxide surface layer in excess of about 10 nm per 180 seconds of chemical treatment for ozone TEOS.

66. (Currently Amended) The processing system as recited in ~~claim 64~~ claim 65, wherein a variation of said etch amount across said substrate is less than about 2.5%.